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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/993,453	11/19/2001	Steven G. Goebel	8540G-000079	8320
27572	7590	05/05/2004	EXAMINER	
HARNESS, DICKEY & PIERCE, P.L.C.			DUONG, THANH P	
P.O. BOX 828			ART UNIT	PAPER NUMBER
BLOOMFIELD HILLS, MI 48303			1764	

DATE MAILED: 05/05/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/993,453

Applicant(s)

GOEBEL ET AL.

Examiner

Tom P Duong

Art Unit

1764

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 19 November 2001.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-38 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-38 is/are rejected.
- 7) ☒ Claim(s) 1-38 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 11/19/2001.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Claim Suggestions

In claims 9, 22, and 34, a "water spray member" should be replaced with "spray vaporization zone" to provide consistency of terminology in specification (page 16 lines 18-19).

Claim Objections

1. Claims 1-38 are objected to because of the following informalities:

In claim 12, the term "stoichemetric" should be replaced with "stoichiometric."

Appropriate correction is required.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claims 1, 16, and 28 are rejected under 35 U.S.C. 102(a) as being anticipated by Wheeler (6,277,509). Regarding claims 1, 16, and 28, Wheeler discloses a fuel processor (Fig. 1) for rapidly achieving operating temperature, said fuel processor

Art Unit: 1764

comprising: a reformer (64) converting a hydrogen-containing fuel to H₂-containing reformat (via line 70); a shift reactor (76) in fluid communication with said reformer, said shift reactor being operable to reduce carbon monoxide levels (Col.7, lines 50-57) of said reformat; a selective oxidizer (78) constitutes a preferential oxidation reactor in fluid communication with said shift reactor, said preferential oxidation reactor being operable to further reduce carbon monoxide levels (Col. 7, lines 50-57) of said reformat exiting said shift reactor; and a first combustion heater system (A.T.R. has a POX section and SR section) coupled to at least one of said reformer (64), said shift reactor, and said combustion heater system preferential oxidation reactor, said first being operable in a lean state to produce thermal energy as a product of the combustion of air and fuel in the form of a first heated exhaust stream (46); and a second combustion heater system (58) coupled to at least another of said reformer (40), said shift reactor (76), and said preferential oxidation reactor (78), said second combustion heater system (58) being operable to produce thermal energy as a product of the combustion of air and fuel in the form of a second heated exhaust stream (72).

3. Claims 1-9, 12, 16-22, and 28-34 are rejected under 35 U.S.C. 102(e) as being anticipated by Borup et al. (6,521,204). Regarding claim 1, Borup discloses a fuel processor (Fig. 1) for rapidly achieving operating temperature, said fuel processor comprising: a reformer (40) converting a hydrogen-containing fuel to H₂-containing reformat (via line 46); a shift reactor (50) in fluid communication with said reformer, said shift reactor being operable to reduce carbon monoxide levels (Col. 4, lines 30-38)

Art Unit: 1764

of said reformat; a preferential oxidation reactor (54) in fluid communication with said shift reactor, said preferential oxidation reactor being operable to further reduce carbon monoxide levels (Col. 3, lines 30-48) of said reformat exiting said shift reactor; and a first combustion heater system (POX section) coupled to at least one of said reformer (40), said shift reactor, and said combustion heater system preferential oxidation reactor, said first being operable in a lean state to produce thermal energy as a product of the combustion of air and fuel in the form of a first heated exhaust stream (46).

Regarding claim 2, Borup discloses a second combustion heater system (16) coupled to at least another of said reformer (40), said shift reactor (50), and said preferential oxidation reactor (54), said second combustion heater system (16) being operable to produce thermal energy as a product of the combustion of air and fuel in the form of a second heated exhaust stream (exhaust leaving combustor 16, Fig. 1). Regarding claim 3, Borup shows a second combustion heater comprising an air inlet (AIR, Fig. 1) providing fresh air thereto. Regarding claim 4, Pettit shows the second combustion heater system is positioned in series with said first combustion heater system (Fig. 1). Regarding claim 5, Borup discloses the second combustion heater (16) comprising a first inlet providing fresh air (AIR, Fig. 1) thereto and a second inlet (46) in fluid communication with said first heated exhaust stream. Regarding claim 6, Borup shows the heated exhaust stream (46) is used to dilute the fresh air (AIR, Fig. 1) to control the temperature of second heated exhaust stream (exhaust leaving combustor 16, Fig. 1). Regarding claim 7, Borup shows a control valve system (100) selectively diverting said first heated exhaust stream (46) from said first combustion heater system from passing

Art Unit: 1764

through said shift reactor (50). Regarding claim 8, Borup discloses plurality of heat exchangers (48, 60, 93, 102) operatively associated with at least one of said reformer, said shift reactor, and said preferential oxidation reactor, said heat exchanger being exposed to at least one of said first heated exhaust stream and said second heated exhaust stream for heating said at least one of said reformer, said shift reactor, and said preferential oxidation reactor. Regarding claim 9, Borup shows a water spray member (18) coupled downstream from said second combustion heater system (16), said water spray member being operable to maintain a predetermined temperatures of said second heated exhaust stream (Col. 3, lines 47-53). Regarding claim 12, Borup discloses the combustion of said air and said fuel in said first combustion heater system is lean of stoichiometric condition and said combustion of said air and said fuel in said second combustion heater system is generally near ideal stoichiometric condition (Abstract). Regarding claims 16 and 28 recite limitations similar to claims 1 and 2; thus, claims 16 and 28 are rejected for the same reasons as applied to claims 1 and 2, above. Claims 17-20 and 29-32 recite limitations similar to claims 3-6, respectively; thus, claims 17-20 and 29-32 are rejected for the same reasons as applied to claims 3-6, above. Regarding claims 21 and 33, Borup discloses a first control valve system (100) selectively routing said first heated exhaust stream to said second combustion heater system (16) during a startup cycle. Claims 22 and 34 recite limitations similar to claim 9; thus, claims 22 and 34 are rejected for the same reasons as applied to claim 9, above.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 10, 23, and 35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Borup et al. '204 as applied to claims 2, 16, and 28 above, and further in view of Okamoto et al. (6,582,841). Regarding claims 10, 23, and 35, Borup fails to disclose a control valve system selectively routing an O₂-containing cathode effluent from a fuel cell stack to a catalyst combustor and said second combustion heater system. Okamoto teaches a pressure regulator valve (26), which controls the flow rate of the exhaust air (unreacted air) from the stack to the combustor 14. Thus, it would have been obvious in view of Okamoto to one having ordinary skill in the art to modify the fuel processor of Borup with a pressure regulator valve as taught by Okamoto in order to control the exhaust flow rate from the stack to the combustor.
5. Claims 11 and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over references as applied to claims 10 and 23 above, and further in view of Keskula et al. (6,159,626). Regarding claims 11 and 24, the prior art discloses all the limitations in claims 11 and 24 except a cathode back pressure valve selectively applying a fluid back pressure to facilitate routing of said O₂-containing cathode effluent to said catalyst combustor. Keskula teaches a back pressure valve 47 is used to control the amount of

bleed off cathode exhaust supplied to the combustor 34 and such valve applies a back pressure to allow the majority of the cathode exhaust to the combustor. Thus, it would have been obvious in view of Kesbula to one having ordinary skill to modify the fuel processor of the prior art with a back pressure valve of Kesbula to allow greater portion of the cathode exhaust to the combustor.

6. Claims 13, 15, 25, 27, 36, and 38 are rejected under 35 U.S.C. 103(a) as being unpatentable over the applied references (Borup '204 in view of Okamoto '841), as applied to claims 10 and 23 above, and further in view of Davis, Jr. et al. (4,534,165). Regarding claims 13, 25, and 36, the applied references (Borup in view of Okamoto) fail to disclose a catalyst combustor positioned in series upstream from said second combustion heater system. Davis teaches the importance of staging a catalytic combustor upstream of a pilot burner (1). Such configuration provides the benefits of minimizing thermal shock to the catalyst (Col. 4, lines 1-10) and also ensures complete combustion of the fuel, which might not completely reacted in the catalytic combustor (Col. 4, lines 28-35). Thus, it would have been obvious in view of Davis to one having ordinary skill in the art to modify the fuel processor of the applied references with a catalytic combustor upstream of a burner as taught by Davis in order to gain the above benefits. Regarding claims 15, 27, and 38, the applied references (Borup in view of Okamoto) fail to disclose a catalyst combustor positioned such that an output of said catalyst combustor is input downstream of said second combustion heater system. Davis teaches the importance of staging a catalytic combustor upstream of a pilot burner (1). Such configuration provides the benefits of minimizing thermal shock to the

Art Unit: 1764

catalyst (Col. 4, lines 1-10) and also ensures complete combustion of the fuel, which might not completely reacted in the catalytic combustor (Col. 4, lines 28-35). Thus, it would have been obvious in view of Davis to one having ordinary skill in the art to modify the fuel processor of the applied references with a catalytic combustor upstream of a burner as taught by Davis in order to gain the above benefits

7. Claims 14, 26, and 37 are rejected under 35 U.S.C. 103(a) as being unpatentable over the applied references (Borup '204 in view of Okamoto '841), as applied to claims 2, 16, and 28 above, and further in view of Mongia et al. (6,107,693). Regarding claims 14, 26, and 37, the applied references (Borup in view of Okamoto) fail to disclose a catalyst combustor positioned in series downstream from said second combustion heater system. Mongia teaches the importance of staging a catalytic reactor part 44A in series downstream of the burner 44B, and such configuration provides the benefit of preheating the catalytic reactor part 44A during start-up. Thus, it would have been obvious in view of Mongia to one having ordinary skill in the art to modify the fuel processor of the applied references with a catalytic reactor part 44A in series downstream of the burner 44B as taught by Mongia to gain the above benefit.

Conclusion


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tom P Duong whose telephone number is (571) 272-2794. The examiner can normally be reached on 8:00AM - 4:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Glenn Caldarola can be reached on (571) 272-1444. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

TD
April 21, 2004

TD



Alexa Doroshenko
Patent Examiner
Art Unit 1764

